DOCUMENT RESUME

ED 223 681 TM 820 812

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TITLE The Relationship between First-Year Medical School Grades and Academic, Personality, and Attitude Measures: Wright State University School of Medicine, Class of 1984. Program Evaluation Studies, Report Number 5.
INSTITUTION Wright State Univ., Dayton, Ohio.
PUB DATE Mar 82
NOTE 13p.; This study was partially funded by the Miami Valley Area Health Education Center.
PUB TYPE Reports - Research/Technical (143)

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS *Academic Achievement; Check Lists; College Entrance Examinations; Correlation; Evaluation Methods; Grade Point Average; Higher Education; Medical Education; *Medical Students; *Personality Traits; Predictive Validity; *Student Attitudes; *Student Characteristics
IDENTIFIERS Medical College Admission Test; Wright State University OH

ABSTRACT

This study investigated (1) selected academic, personality, and attitude characteristics of the Wright State University School of Medicine (WSUSOM) class of 1984 and (2) the relationships between first-year grades and various personality, attitude, and premedical academic measures. In September 1980, first-year medical students (n-99), class of 1984, completed three personality and attitude measures: (1) Rotter Locus of Control; (2) Adjective Check List; and (3) Student Orientations Survey. In addition, the following data were gathered: (1) undergraduate grade point average, (2) Medical College Admission Test scores; (3) and Wright State University School of Medicine first-year grade point average. The New Medical College Admission Test correlated satisfactorily with first-year academic performance in medical school. Similarly, undergraduate grade point average was a valuable predictor of first-year academic achievement in medical school. With regard to personality characteristics, academically successful medical students were characterized as persevering, competitive, achievement-oriented, responsible, and independent. (Author/PN)

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ED223681

Program Evaluation Studies

A series of occasional papers from the Group on Evaluation, Department of Postgraduate Medicine and Continuing Education

WRIGHT STATE Wright State University School of Medicine Dayton, Ohio

REPORT NO. 5 MARCH 1982

THE RELATIONSHIP BETWEEN FIRST-YEAR MEDICAL SCHOOL GRADES AND ACADEMIC, PERSONALITY, AND ATTITUDE MEASURES: Wright State University School of Medicine Class of 1984

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Introduction

The New Medical College Admission Test (MCAT) has been found to correlate satisfactorily with first-year academic performance in medical school (1-8). Similarly, undergraduate grade point average has been demonstrated to be a valuable predictor of first-year academic achievement in medical school (7, 9-17). With regard to personality characteristics, academically successful medical students have been characterized as persevering, competitive, achievement-oriented, responsible, and independent (18, 19).

This study was partially funded by the Miami Valley Area Health Education Center.

Thus, it would seem that the predictors of academic success in the first-year of medical school have been identified through substantial research findings. However, medical schools differ widely in their missions, curricular emphases, and student populations. Therefore, it is important for young medical schools to investigate possible predictors of academic performance on the local level and to compare these results with the findings reported elsewhere. The current study investigated (1) selected academic, personality, and attitude characteristics of the Wright State University School of Medicine (WSUSOM) Class of 1984 and (2) the relationships between first-year grades and various personality, attitude, and premedical academic measures.

Method

In September 1980 during the first week of their first year at Wright State University School of Medicine, ninety-nine Class of 1984 students completed three personality and attitude measures (20-22):

1. Rotter Locus of Control (RLOC)

   an instrument which places the individual on the continuum of external/internal locus of control. An individual who is toward the external end of the continuum believes and acts as if outcomes are (a) contingent upon luck, chance, or fate, (b) under the control of others, or (c) unpredictable. An individual who is toward the internal end of the continuum believes and acts as if outcomes are contingent upon one's own behavior or one's own relatively permanent characteristics.

2. Adjective Check List (ACL)

   an instrument which yields scores on 24 personality scales.

3. Student Orientations Survey (SOS)

   an instrument which yields scores on 10 scales related to attitudes toward higher education. In this study 6 of the 10 scales were used; the 6 scales dealt with the purposes of a higher education, preferences for different teaching/learning modes, and attitudes toward student and faculty roles in decision-making.

In addition, the following data were gathered for the Class of 1984:

1. Age at WSUSOM matriculation
2. Undergraduate Grade Point Average (GPA)
3. Medical College Admission Test (MCAT) scores -- Biology, Chemistry, Physics, Problem-Solving, Reading, Quantitative
4. WSUSOM Year 1 Grade Point Average (GPA)

To reduce the number of variables, factor analysis was performed on the ACL, SOS, and MCAT. Factor analysis (Varimax Rotation Method) reduced the 24-scale ACL to five factors. The Varimax Rotation Method reduced the 6-scale SOS to two factors. The Principal Factoring Without Iterations Method reduced the MCAT to one factor. The resultant parsimonious data set used in certain analyses was:

1. Age at WSUSOM matriculation
2. Undergraduate GPA
3. Medical College Admission Test (MCAT) - 1 factor
4. Rotter Locus of Control (RLOC)
5. Adjective Check List (ACL) - 5 factors
6. Student Orientations Survey (SOS) - 2 factors
7. WSUSOM Year 1 GPA

Factor analysis and all other analyses were performed using Statistical Package for the Social Sciences (23).

Results

Table 1 reports means and standard deviations for variables other than the nonacademic measures. The means and standard deviations for the nonacademic measures have no intuitive meaning to those who do not work regularly with the measures and thus are not included in Table 1. The typical Class of 1984 student entered WSUSOM in the fall of 1980 at about 24 years of age, with a 3.45 undergraduate GPA, and with above average MCAT scores. At the end of Year 1 he/she had achieved a WSUSOM GPA of 2.60.

TABLE 1: MEANS AND STANDARD DEVIATIONS

Variable	No. of students	Mean	Standard Deviation
Age at Matriculation	99	23.879	3.041
Undergraduate GPA	99	3.447	.303
MCAT - Biology	99	8.626	1.389
MCAT - Chemistry	99	8.444	1.430
MCAT - Physics	99	8.343	1.513
MCAT - Problem-Solving	99	8.394	1.441
MCAT - Reading	99	8.111	2.142
MCAT - Quantitative	99	8.424	1.824
Year 1 WSUSOM GPA	97	2.604	.624

With regard to the personality characteristics yielded by the ACL, examination of the factor analysis shows the typical Class of 1984 student upon entering medical school to be independent, confident, determined, responsible, self-controlled, friendly, and adventurous. Concerning attitudes toward higher education measured by the SOS, the typical Class of 1984 student has a strong preference for specific, clear-cut formal course requirements (assignment learning) rather than the self-directed approach to learning (independent study). He/she would prefer being evaluated by faculty (assessment) rather than having faculty and students collaborate in decision-making (interaction). The Class of 1984 student is slightly more inclined to value education as intrinsically rewarding (inquiry) than to value the practical and useful aspects of education (achievement). Table 2 contains the SOS comparisons. The Rotter Locus of Control cannot be interpreted in the same manner as the ACL and SOS.

TABLE 2: COMPARISONS FOR STUDENT ORIENTATIONS SURVEY
(n = 98)

	Standard Mean Score	Standard Deviation	t statistic[a]
Achievement (P)	47.362	8.217	2.476[b]
Inquiry (E)	49.965	6.513	
Assignment Learning (P)	54.526	7.651	7.290[c]
Independent Study (E)	44.808	8.003	
Assessment (P)	49.590	8.792	4.932[c]
Interaction (E)	42.592	7.958	

Note: P = preparatory orientation toward higher education (i.e., valued in terms of the acquisition of useful knowledge, skills, vocations, and social roles)

E = exploratory orientation toward higher education (i.e., valued for its opportunities to explore one's interests, ideas, and personal identity)

[a]The t statistic was used with the appropriate formula for differences between two dependent samples.

[b]$p < .01$

[c]$p < .001$

Turning to the prediction of WSUSOM Year 1 GPA, Table 3 reports its correlation with the predictor variables. Academic achievement at WSUSOM was, as expected, most highly correlated with other academic measures--MCAT (r = .55) and Undergraduate GPA (r = .44). Small, but statistically significant, correlations were found for most of the nonacademic variables--RLOC (r = .17), ACL Factor 1 (r = -.37), ACL Factor 3 (r = -.17), ACL Factor 5 (r = .18), SOS Preparatory (r = -.27), SOS Exploratory (r = -.20). These correlations between

academic achievement and nonacademic variables can be interpreted as follows:

TABLE 3: CORRELATION OF WSUSOM YEAR 1 GPA WITH PREDICTOR VARIABLES
(n = 96)

Predictor Variable	Correlation with WSUSOM Year 1 GPA
1. Age at Matriculation	.00
2. Undergraduate GPA	.44+
3. MCAT (single factor)	.55+
4. Rotter Locus of Control	.17*
5. Adjective Check List Factor 1 (autonomous, assertive)	-.37+
6. Adjective Check List Factor 2 (responsible, honorable)	.05
7. Adjective Check List Factor 3 (outgoing, affiliative)	-.17*
8. Adjective Check List Factor 4 (friendly, trustworthy)	.11
9. Adjective Check List Factor 5 (adventurous, spontaneous)	.18*
10. Student Orientations Survey - Preparatory (education as practical, useful)	-.27+
11. Student Orientations Survey - Exploratory (education as a means of discovering one's ideas, interests, and identity)	-.20*

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* $p < .05$

+ $p < .01$

RLOC - Students who score higher in external locus of control do slightly better academically.

ACL Factor 1 - Students who tend to be autonomous and assertive do less well academically.

ACL Factor 3 - Students who tend to be outgoing and affiliative do slightly less well academically.

ACL Factor 5 - Students who tend to be adventurous and spontaneous do slightly better academically.

SOS - Both the preparatory factor (education as practical and useful) and the exploratory factor (education as a means of discovering one's ideas, interests and identity) were negatively correlated with academic achievement. This finding is difficult to interpret in that the two factors are opposite views. On the surface, the correlations suggest that high achievers are neither preparatory nor exploratory in their view toward education. Perhaps high achieving medical students view education from a third perspective not measured by the SOS.

Multiple regression analysis was performed using WSUSOM Year 1 GPA as the criterion (dependent variable) and all eleven predictors as independent variables. Table 4 shows that when all eleven variables are placed in the regression equation, 45.3 percent of the variance in academic achievement (WSUSOM Year 1 GPA) can be predicted. A more efficient prediction formula uses Sechrest's concept of incremental validity (24). Sechrest and, in the medical education context, Friedman (25) argue for the inclusion of potentially useful predictors after the usually available variables have been entered in the regression equation. In the current study, MCAT and undergraduate GPA were first entered into the equation and then nonacademic predictors on a stepwise basis. The five predictors accounted for 46.7 percent of the variance (see Table 4). Entering the three nonacademic predictors results in a 6.8 percent increase in variance accounted for.

TABLE 4: MULTIPLE REGRESSION ANALYSIS FOR PREDICTION OF WSUSOM YEAR 1 GPA

Predictors	Percent of WSUSOM Year 1 GPA Variance (Adjusted) Accounted for by Predictors*
All eleven predictors entered:	
Age at matriculation Undergraduate GPA MCAT RLOC ACL - 5 factors SOS - 2 factors	45.3
Incremental approach with stepwise entry:	
1. MCAT/Undergraduate GPA	39.9
2. ACL - Autonomous/Assertive Factor	42.8
3. SOS - Preparatory Factor	45.2
4. ACL - Adventurous/Spontaneous Factor	46.7

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*adjusted for positive bias of the sample R^2

Discussion

Consistent with previous research (1-17), academic success during the first-year of medical school for the Class of 1984 was best related to prior academic measures: Undergraduate Grade Point Average ($r = .44$) and the Medical College Admission Test ($r = .55$).

While the personality profile of the WSUSOM Class of 1984 student is quite similar to that reported by other researchers (18,19), it is noteworthy that certain prevalent personality characteristics for the Class of 1984 may be detrimental to academic success. For example, for the Class of 1984 autonomous and assertive behaviors were associated with lower course grades. Similarly, those students who tend to have an internal locus of control do slightly less well academically. Most striking among the findings dealing with attitudes toward higher education is the lack of preference for self-directed learning, a long-espoused goal of WSUSOM.

While personality and attitude measures are useful in characterizing a medical school class and in discovering nonacademic correlates of academic success in medical school, they were of limited value in predicting first-year academic performance. The study demonstrated that predictive ability is not substantially enhanced by adding nonacademic predictors after the inclusion of the more powerful academic predictors--Undergraduate GPA and MCAT.

Candidates for admission to WSUSOM are selected on the basis of their promise of fulfilling WSUSOM's goals for its graduates: (1) becoming a licensed physician, (2) practicing primary care medicine, (3) practicing in underserved geographic locations (especially within southwestern Ohio), (4) exhibiting humanistic qualities in patient care, and (5) becoming a lifelong, self-directed learner. After one year of medical school, only one criterion measure related to the above goals is available--WSUSOM Year 1 GPA. At subsequent junctures in their medical education, other criteria (e.g., Biennium 1 GPA, Clinical Clerkship GPA, NBME scores, practice specialty, practice location) for the Class of 1984 will be available. Future studies of prediction for the Class of 1984 will use these criteria and be integrated with investigations of other WSUSOM classes (26-28).

References

1. New Medical College Admission Test: Interpretive Manual. Washington, D.C.: Association of American Medical Colleges, 1977.

2. CULLEN, T.J., DOHNER, C.W., PECKHAM, P.D., SAMSON, W.E., and SCHWARZ, M.R. Predicting First-Quarter Test Scores from the New Medical College Admission Test. *J. Med. Educ.*, 55:393-398, 1980.

3. DEIGHTON, B.C., SMITH, D.U., and GALLAGHER, R.E. The Relationship Between Scores on the New Medical College Admission Test and Performance in the First Year of Medical School: A Preliminary Study. *Annu. Conf. Res. Med. Educ.*, 18:133-138, 1979.

4. MCGUIRE, F.L. The New MCAT and Medical Student Performance. *J. Med. Educ.*, 55:405-408, 1980.

5. CULLEN, T.J., JOHNSON, C.W., PECKHAM, P.D., and SAMSON, W.E. Restriction of Range and the Predictive Validity of the New Medical College Admission Test. *Annu. Conf. Res. Med. Educ.*, 19:273-276, 1980.

6. BROOKS, C.M., JACKSON, J.R., HOFFMAN, H.H., and HAND, G.S., Jr. Validity of the New MCAT for Predicting GPA and NBME Part 1 Examination Performance. *J. Med. Educ.*, 56:767-769, 1981.

7. GOLMON, M.E., and BERRY, C.A. Comparative Predictive Validity of the New MCAT Using Different Admission Criteria. *J. Med. Educ.*, 56:981-986, 1981.

8. VELOSKI, J., HOJAT, M., and ZELEZNIK, C. The Overall Validity of the New MCAT. *Annu. Conf. Res. Med. Educ.*, 20:129-134, 1981.

9. HILL, J.K. Assessment of Intellectual Promise for Medical School. *J. Med. Educ.*, 34:959-964, 1959.

10. JOHNSON, D.G. A Multi-factor Method of Evaluating Medical School Applicants. *J. Med. Educ.*, 37:656-665, 1962.

11. BUEHLER, J.A., and TRAINER, J.B. Prediction of Medical School Performance and Its Relationship to Achievement. *J. Med. Educ.*, 37:10-18, 1962.

12. ROEMER, R.E. Nine Year Validity Study of Predictors of Medical School Success. *J. Educ. Res.*, 59:183-185, 1965.

13. BEST, W.R., DEKMA, A.J., FISHER, L.A., and SMITH, N.E. Multivariate Predictors in Selecting Medical Students. *J. Med. Educ.*, 46:42-50, 1971.

14. MOFFATT, D.J., JACOBS, A.W., and METCALF, W.K. Predictors of Academic Performance in Gross Anatomy. *J. Med. Educ.*, 46:545-548, 1971.

15. GOUGH, H.G., and HALL, W.B. The Prediction of Academic and Clinical Performance in Medical School. *Res. Higher Educ.*, 3:301-314, 1975.

16. MCGUIRE, F.L. Fifteen Years of Predicting Medical School Performance. *J. Med. Educ.*, 52:416-417, 1977.

17. WEST, D.B., COLE, D., BERNIER, F.A., and MARKERT, R.J. Useful Statistical Procedures for Identifying Academically "At Risk" Medical Students. *Annu. Conf. Res. Med. Educ.*, 17:15-20, 1978.

18. MARKERT, R.J. The Relationship Between Grades, Clinical Competence, and Entry Levels Among First-year Osteopathic Medical Students. Unpublished doctoral dissertation, Michigan State University, 1976.

19. GOUGH, H.G., and HALL, W.B. An attempt to predict graduation from medical school. *J. Med. Educ.*, 50: 940-950, 1975.

20. PHARES, E.J. Locus of Control in Personality. Morristown, N.J.: General Learning Press, 1976.

21. GOUGH, H.G., and HEILBRUN, A.B., Jr. The Adjective Check List Manual. Palo Alto, California: Consulting Psychologists Press, 1980.

22. MORSTAIN, B.R. Student Orientations Survey Form E Technical Manual. Newark, Delaware: University of Delaware, 1976.

23. NIE, N.H., HULL, C.H., JENKINS, J.G., STEINBRENNER, K., and BRENT, D.H. Statistical Package for the Social Sciences. New York: McGraw-Hill, 1975.

24. SECHREST, L. Incremental Validity: A Recommendation. *Educ. Psych. Meas.*, 23:153-158, 1963.

25. FRIEDMAN, C.P., and BAKEWELL, W.E. Incremental Validity for the New MCAT. *J. Med. Educ.*, 55:399-404, 1980.

26. MARKERT, R.J. The Prediction of National Board Performance, Specialty, and Location of Residency for the Wright State University School of Medicine Class of 1980. Program Evaluation Studies. Report No. 2. Dayton, Ohio: Department of Postgraduate Medicine and Continuing Education, Wright State University School of Medicine, April, 1981.

27. MARKERT, R.J. Medical Education at Wright State University: An Evaluation During the First Year of Residency by the Class of 1980 and Their Residency Supervisors. Program Evaluation Studies. Report No. 3. Dayton, Ohio: Department of Postgraduate Medicine and Continuing Education, Wright State University School of Medicine, June, 1981.

28. MARKERT, R.J. Stability and Change of Medical Specialty Choice: Wright State University School of Medicine Class of 1981. Program Evaluation Studies. Report No. 4. Dayton, Ohio: Department of Postgraduate Medicine and Continuing Education, Wright State University School of Medicine, December, 1981.

PROGRAM EVALUATION STUDIES

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